



# RESTORATION

Some of the most well publicized stories about NPS natural resource management work revolve around efforts to restore plant and animal species or natural processes in parks. While many of these are wonderful success stories, they represent the tip of the iceberg of restoration work that should be done. In most cases, restoration projects are unfunded or inadequately staffed, or information about the status of a threatened or endangered species or natural process is incomplete. Although restoration projects often portray triumphs, they actually represent a failure to either recognize or take action to prevent a potential problem. Today, we realize that we must focus on preventing the decline of species, loss of habitat, and loss of natural processes in the first place. After all, if certain species are in trouble in national parks, what does this tell us about the larger biomes in which we all live?

## Wildlife Yellowstone wolf restoration: an ecological and symbolic milestone

by Sue Consolo-Murphy

In 1996, Yellowstone National Park continued its efforts to restore a population of endangered gray wolves in the ecosystem. Despite reduced funding, we are on our way to meeting the objective, ahead of schedule and under budget.

Seventeen wolves were captured in 1996 and transplanted from Canada to Yellowstone, held for 10 weeks in acclimation pens, and visited only when fed road-killed ungulates. After release, several thousand visitors were lucky to view wolves chasing and killing elk or interacting with bears during spring. A park ranger and a group of visitors watched a most exciting encounter between two packs, which likely resulted in one young wolf's death. This was not the first fatal encounter between wolves, although human-caused mortalities still outnumber interpack strife as a cause of wolf deaths.

Yellowstone's first fourteen wolves bore two litters totaling nine pups. In 1996, four packs produced 14 pups. By the end of 1996, 11 wolves had died—three

were illegally shot, three were killed by vehicles, two were killed by other wolves, one was removed due to livestock depredation, one was burned in a hot spring, and one died of unknown causes. One pup was accidentally injured and sent to a captive facility. Despite these losses, 40 wolves freely roamed the greater Yellowstone area. In addition, 10 young wolves brought from northwestern Montana will be released in early 1997, a year when as many as eight packs could have pups. The original plan to transplant wolves for three to five years was terminated, due to reduced funding but also due to the unexpected reproductive success of the wolves. Furthermore, although lone wolves roam widely, conflicts have been low, resulting in less than two dozen sheep and no cattle lost of 412,000 livestock that graze the ecosystem. The goal to restore wolves and begin delisting them by approximately 2002 appears within reach.

The program's visibility has resulted in opportunities to educate audiences about predator-prey relationships, endangered species restoration, and the importance of maintaining intact ecosystems. The program also has tremendous support from private groups and individuals who have generously donated their time and money; about one-third of the program is privately funded. Such partnerships are critical in this era of austere budgets and downsizing.

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Gray Wolf (*Canis lupus*).

The return of the only species known to be missing from the world's first national park for the past half-century is a milestone in ecological restoration. It not only restores the wildlife complement of greater Yellowstone, but also is a symbolic victory for conservationists who patiently and persistently reversed the once-dominant attitude against predators to one of acceptance. Aldo Leopold would be proud that many humans have come to respect even these "killer creatures" with whom we share the Earth. We must capitalize on this public support to continue restoring other missing species and, more importantly, prevent further endangerment of species and their habitat.



Yellowstone National Park

This wolf pup, one of the first born in Yellowstone National Park in more than half a century, is creating history as it reclaims its rightful heritage.

## Ferrets recovering at Badlands

by Bruce Bessken and Glenn Plumb

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Escape from predators is not as easy for prairie dogs in Badlands National Park these days; they may also need a little luck. Recent restorations of the black-footed ferret (*Mustela nigripes*) in the South Dakota park have brought this highly specialized predator of the prairie dog back from the brink of extinction. Through the fall of 1996, biologists had released 134 young-of-the-year and 36 adult captive-bred black-footed ferrets into the Conata Basin-Badlands prairie dog complex contiguous with both the park and Buffalo Gap National Grassland.

Ferrets are very closely linked to the prairie dog for food, shelter, and habitat. Since the early 1900s prairie dog range is estimated to have declined as much as 98% due to poisoning, disease, and changes in land uses. The sum of these impacts brought about extinction of the ferret in the wild by 1987, when the last of the known 18 remaining individuals were collected for captive breeding. Between 1988 and 1993, interagency collaboration and public support, in the face of considerable opposition from agricultural interests, led to the decision to initiate experimental ferret recovery on federal lands in southwestern South Dakota.

In 1994, biologists began a five-year interagency effort to restore the ferret. A partnership between the

National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, and the South Dakota Game, Fish, and Parks Department provides dedicated personnel and funds to reintroduce the animals and monitor their populations. Using radio telemetry and visual searches for the nocturnal ferret, biologists learned in 1996 that given limited intervention, approximately 40% of the introduced animals survive transition to the wild. More importantly, population renewal is under way as wild-born litters have been found each summer since the project was initiated. Conclusive evidence shows that all possible female classes (i.e., those released in 1994 and 1995, and those born in the wild in 1995) reared litters in 1996.

Pending continuing releases through 1998 and sustained recruitment, population models suggest a minimum viable population could be established by the turn of the century. A long-term commitment to monitoring and managing this showcase population, not yet secured, is needed to guarantee the contribution it could make to the national recovery program as a donor population for additional reintroductions. Conservation biologists expect this experimental program to illuminate the conservation potential for prairie dog ecosystems, which provide habitat for over 140 Great Plains vertebrates. The black-footed ferret recovery program has already proven a strong stimulus to vocal constituencies for this broader conservation context.



Badlands National Park, Black-footed Ferret Recovery Program

Black-footed ferret

## Paying for restoration The native plant conservation initiative

by Margaret Sotham

Where plant conservation is concerned, collaborative partnerships with federal and nonfederal entities are essential to achieving the National Park Service mission. Comprising more than 50% of the endangered species list, plants receive less than 3% of federal restoration funding. In 1995, the Park Service spent \$2.6 million on endangered species, but only \$116,000 on plants—less than 4%.

In 1994, the National Park Service joined in a memorandum of understanding with the U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service, Agricultural Research Service, Natural Resources Conservation Service, U.S. Geological Survey, Department of Defense, and Office of Surface Mining Reclamation and Restoration to work cooperatively on native plant conservation. This effort created the Federal Native Plant Conservation Committee, which in turn laid the foundation for the Native Plant Conservation Initiative, a partnership between these federal agencies and nearly 60 nonfederal cooperators.

Under the initiative, federal and nonfederal entities work cooperatively to complete on-the-ground conservation projects. Through a grant program administered by the National Fish and Wildlife Foundation, the initiative has underwritten 37 grants totaling nearly \$800,000 in federal and nonfederal matching funds for projects on public and private lands in 26 states. One of these was awarded to the Grand Canyon Habitat Restoration Program in 1996 for a park visitor-volunteer effort to battle exotics. The volunteers removed nine exotic species totaling nearly 10,000 plants and replaced them with natives. They have also established a monitoring program to detect any further infestations of these alien plants. In 1997, \$275,000 will be administered through this grant. Despite these efforts, many native plant conservation needs remain unmet. In 1996, only 27 of the 126 grant proposals submitted were funded by the initiative. In 1997, more than 100 proposals requesting \$1.2 million are under consideration.

Some of the initiative's greatest success has been in raising awareness of plant conservation issues throughout

its member agencies and with the public. Two working groups, one for restoration and one for invasive exotics, educate and train federal, state, and private groups in dealing with these conservation issues. Taking its message to the public, the initiative has created an ongoing outreach program that includes a homepage on the World Wide Web, the "Celebrating Wildflowers" public awareness campaign, a traveling exhibit on native plants, television public service announcements distributed in cooperation with the Garden Club of America, and printing and distribution of the new Wild Wealth brochure detailing the importance of native plants in our everyday lives. A newsletter and accomplishments report are currently in development. Under a new partnership between American Express and the National Park Foundation, prepaid phone cards feature native plant images and scenes from national parks. Retail sales and promotional use of the native plant cards benefit the initiative.

These projects represent the vital first phase in conserving the nation's plant resources. They are small but pivotal steps toward the larger strides needed if we are to preserve our most important asset—biodiversity.

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Volunteers repot native plants in preparation for transplanting as part of the Grand Canyon Habitat Restoration Program.

Nine exotic species were first removed, totaling nearly 10,000 plants, then replaced with natives, such as cacti. A monitoring program will look for further infestations of alien plants.



## Restoring ecosystem processes Experimental flood builds habitat in Grand Canyon

by Bill Jackson

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**L**ike wildfires, floods have long been viewed as natural disasters. Yet, just as fire rejuvenates forest and rangeland ecosystems, flooding disturbs stream channels and reinvigorates riparian resources. Such was the thinking behind an experimental flood in the Colorado River in 1996 that was designed to redistribute sand in Glen Canyon National Recreation Area and Grand Canyon National Park and provide the river with an ecological fresh start.

Ever since the Glen Canyon Dam began regulating the Colorado River in 1965, both Glen and Grand canyons have been deprived of annual snowmelt floods each spring. This imparted an unnatural “stability” to downstream aquatic and riparian ecosystems, many of which exist on a “foundation” of sand in the river and along its edge. Before

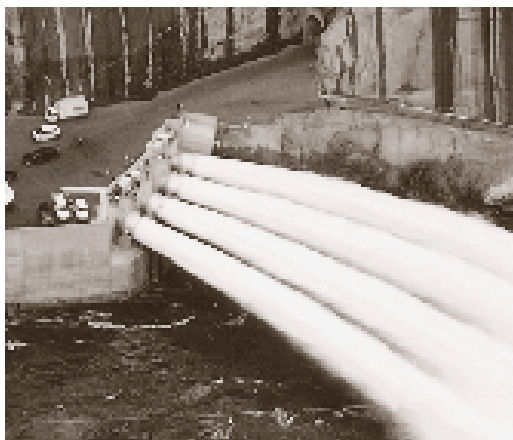
the dam, this sand foundation deposited and eroded on an annual basis. The controlled, habitat-building flood was billed as an experiment in sediment redistribution and was released from Glen Canyon Dam for one week in late March 1996. Its primary purpose was to determine if and how sediments stored on the bed of the Colorado River could be relocated to the margins of the river to recreate the sandbars and associated aquatic and riparian habitats, which had been lost to progressive erosion since closure of the dam.

The 45,000 cubic-feet-per-second water release, which is slightly more than half the pre-dam average annual flood peak, was proposed as part of the preferred alternative in the environmental impact statement on the operation of Glen Canyon Dam. A large, multi-agency monitoring and research program supported by the Bureau of Reclamation was conducted in conjunction with the release and conclusions are still pending. However, preliminary results suggest that the flood was successful in rebuilding sandbars and aquatic habitats. Nonetheless, the effects of the flood on sandbar dynamics were complex. While the vast majority of sandbars in the sand supply-limited reach above the confluence of the Little Colorado River increased dramatically in size, sandbars in the sand-rich reach downstream from the Little Colorado demonstrated a more variable response, with some deposits enlarging and others eroding. The flood had an overall beneficial effect on sandbar deposits, and little, if any, adverse impacts to sensitive resources such as endangered fish, trout, aquatic food bases, or cultural resources occurred.

Implementation of the experimental flood was controversial. Upper basin states and hydropower interests opposed the release until criteria were agreed upon in the Colorado River Annual Operating Plan, which constrains the future use of flood releases as a management tool. Some controversy still surrounds the long-term use of flooding for management, but the 1996 experimental flood will provide a scientific basis for prescribing future high-flow releases to benefit downstream natural, cultural, and recreational resources. Additionally, the high degree of public interest in the event improved the general understanding of floods as a natural ecosystem process. Although the flood was important for both Glen and Grand canyons, it is also significant for the overall management of regulated rivers.

Water gushes out of Glen Canyon Dam, Arizona, in a dramatic experiment to test the ability of a controlled flood to redistribute silt and build sandbars downstream in Grand Canyon.

Ever since 1965 when the dam began operating, the Colorado River has progressively lost terrestrial habitat to erosion. The experimental flood gave the river an ecological fresh start and had an overall beneficial effect on sandbar deposits.



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# Un-plumbing the Everglades

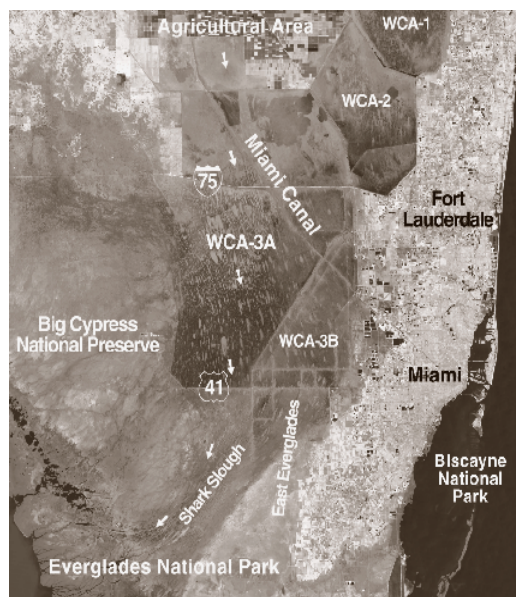
by Robert Johnson

Progress in restoring water quality and ecologically functional water flow at Everglades National Park comes slowly and the process is expensive and complex. However, throughout 1996 various pieces of legislation and cooperative planning efforts have emerged as tools that are facilitating the eventual restoration of this immense natural system.

The Everglades ecosystem represents the southern portion of the greater Kissimmee-Lake Okeechobee-Everglades watershed that once covered more than 8.9 million acres in South Florida. The Everglades portion of this watershed was an expansive shallow-water marsh, characterized by uninterrupted surface water sheetflow, gradual changes in seasonal water levels, and persistent freshwater flows into the downstream estuaries. The unique combination of South Florida hydrology and biogeography has produced a complex mosaic of temperate and tropical plant and animal communities. Over the past 100 years this complex system of uplands, wetlands, and coastal habitats has been modified to accommodate expanding agricultural and urban development. Today this region is home to over six million residents and supports a thriving tourism industry and agricultural economy that impact the fragile South Florida ecosystem.

Land and water management alterations of the Everglades over the past 100 years have resulted in profound changes to the natural water flow and water quality of the system, with associated detrimental impacts to its ecological structure and function. The most significant changes occurred as a result of construction of the Central and Southern Florida Flood Control Project beginning in 1948. Today this is one of the largest plumbing projects in the world, comprising more than 1,200 miles of levees and canals, over 150 water control structures, and 16 major pumping stations. As this project resolved most of the major water supply and flood control problems in South Florida, a second set of equally critical environmental problems emerged. Today there is wide acceptance that the ecological integrity of the Everglades is nearing collapse, which will have major ramifications for the human population and economy of the region.

In response to these concerns, in 1992 Congress directed the Army Corps of Engineers to initiate a com-



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This satellite image of South Florida reveals both natural water flow patterns (arrows) through Big Cypress National Preserve and Everglades National Park and much of the development responsible for water diversions.

prehensive review of the Central and Southern Florida Flood Control Project, with a focus on restoring and enhancing the region's natural systems while maintaining other authorized project purposes. In 1993, the Department of the Interior established an interagency task force, which is currently made up of 22 federal, state, tribal, and local government agencies, to coordinate ongoing and future restoration efforts. In 1994, the Governor of Florida established the Governor's Commission for a Sustainable South Florida to develop recommendations and foster public support for restoring the South Florida ecosystem, while maintaining a sustainable economy and quality communities.

These efforts have converged to form the framework of a comprehensive plan for South Florida ecosystem restoration. The plan includes: (1) the development of an innovative federal, state, and private sector cost-sharing partnership (the 1994 Everglades Forever Act) for environmental and water quality improvements, (2) new federal legislation (the Water Resources Development Act of 1996) to authorize and guide the Army Corps restoration efforts, (3) funding for accelerated land acquisition (the Farm Bill of 1996) to purchase and protect key parcels of land not presently in public ownership, and (4) increased scientific research with an emphasis on adaptive environmental management (the 1997 Department of the Interior South Florida Science Initiative). The target year for restoration efforts to begin is 2006, and the task is expected to cost \$250 million. Continued research and planning are needed now to help achieve this goal.

# Dam removal awaited at Olympic

by Brian Winter

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**B**uilt on the Olympic Peninsula in Washington in the early 1900s, the Elwha and Glines Canyon dams block access of anadromous fish such as salmon and steelhead to over 70 miles of stream habitat, 95% of which lies within Olympic National Park. At the same time, the dams provide only one-third of the power needs for a single pulp mill in nearby Port Angeles. Remaining fish populations are limited to the lowest five miles of stream and are a fraction of their historic sizes. The federal licensing process for the two nonfederal dams began in 1968 and was extremely contentious; to resolve the licensing issue, Congress enacted the Elwha River Ecosystem and Fisheries Restoration Act (P.L. 102-495) in 1992.

Pursuant to the Elwha Act, the Secretary of the Interior has determined that both dams must be removed to meet the goal of the act, which is full



Two hydroelectric dams were constructed in and near Olympic National Park earlier this century. They block salmon and trout passage to more than 70 miles of the Elwha River and its tributaries.

restoration of the Elwha River ecosystem and native anadromous fisheries. Dam retention with fish passage facilities would partially restore only three of the 10 salmon and steelhead stocks that historically inhabited the watershed, or about 48,000 adult fish. Dam removal would restore all 10 stocks, representing over 390,000 adult fish. The Elwha Act is supported by all parties to the licensing process, including the owner of the dams and the National Park Service, and existing and pending litigation has been stayed pending removal of the dams.

In 1996, the National Park Service completed the last of two environmental impact statements related to the proposed restoration efforts. The preferred alternative is the removal of both dams and naturally eroding sediments downstream that have accumulated in the reservoirs, restoration of the fisheries, and revegetation. The estimated cost for the project is \$113 million, including dam acquisition at \$29.5 million, water quality protection, and flood control. However, the project will return \$163 million through direct jobs and increased fish harvest, and support industries in a county hard hit by reduced timber harvests.

Removal of the Elwha and Glines Canyon dams represents the single best opportunity to restore large numbers of salmon in the Pacific Northwest. Salmon stocks will continue to decline to extinction if action is not taken quickly to implement this decision. While federal, state, and tribal entities are taking emergency actions to maintain the existing runs, reversal of the salmon declines and ecosystem degradation awaits the necessary congressional funding.



Without salmon and trout to add substantially to the biomass of the ecosystem, wildlife populations are suspected to have declined in Olympic National Park. Restoration of the fishery would bolster ecosystem productivity.

Removal of the Glines Canyon Dam and its companion downstream is the preferred alternative to restore the Elwha River ecosystem and native anadromous fisheries. The project is expected to cost \$113 million and awaits funding.



# Clearing the air on the Colorado Plateau

by Joe Carriero and Brian Mitchell

The massive landforms, unusual geology, and vivid colors in Grand Canyon, Zion, Canyonlands, and other national parks on the Colorado Plateau provide some of the world's most spectacular scenery. Unfortunately, these wonders are sometimes shrouded by haze and fade from view. Air pollution impairs visibility and obscures the vistas that make the Colorado Plateau special. And unless positive steps are taken, the visibility there could deteriorate even more as a result of the continued economic growth projected for the region.

One step in the right direction may be the 70-point plan, Recommendations for Improving Western Vistas, unveiled in 1996 by the Grand Canyon Visibility Transport Commission. Required by the 1990 Clean Air Act amendments, the commission was formed by the Environmental Protection Agency in 1991 to assess the causes of poor visibility in those Colorado Plateau parks and wilderness areas given special protection under the act. The commission was charged with recommending potential solutions to the EPA.

Among the key recommendations outlined in the plan is the development of policies or programs that promote energy conservation and require the use of renewable resources for energy production. Other key recommendations would cut auto emissions, decrease sulfur dioxide emissions from industrial facilities, set limits on prescribed burning, and track increases in emissions that would affect air quality in clean air corridors.

National Park Service air quality experts and resource managers made significant contributions to the work of the commission. They joined commission members from other federal and local government agencies; the governors of eight western states; and representatives from industry, environmental groups, academia, community organizations, tribes, and the public.

The size of the commission and the diverse interests of the membership made decision making difficult at times. Nevertheless, the process was a good example of ecosystem management in action. The members of

the various committees persevered, and the commission developed a plan that could be a turning point for air quality efforts in the West.

The Environmental Protection Agency now has until mid-1998 to evaluate the commission's recommendations and take action. In the interim, however, the commission is not standing still. The Western Governors' Association recently proposed formation of a policy organization "to initiate and coordinate activities associated with implementing the commission's recommendations." It also proposed that a second group be formed to coordinate science and technology issues related to the commission's recommendations.

Interior Secretary Babbitt praised the work of the commission, calling its plan "real progress toward the national visibility goal." Babbitt said, "the commission's recommendations will begin a new era; one that ensures my grandchildren will see these spectacular places as clearly and find them as inspirational as I did."

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This computer-enhanced photograph shows two visibility conditions at Grand Canyon National park. The right half depicts visibility on a good day. However, on five percent of days, visibility is as bad as or worse than that depicted on the left.



Air Resources Division